Experimental Analysis on hybrid mode Teaching of Applied Fundamental Courses Constructed through Deep Learning

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Abstract:

The vocational or professionals subjects which are based on the practical's and can best teaches and learned by the practical demonstrations only, faces multiple issues in development of skills of students, as they give theoretical knowledge only. So, to complete the deep integration of theoretical knowledge and practical operation with high quality is the urgent need of the teaching reform of practical fundamental courses. This paper proposes a hybrid teaching method in which deep learning approaches has been used to improve the higher-order thinking skills through blended learning, communication and collaboration with peers, and problem-solving processes along with conventional student-teacher method. For this we takes "styling and image consulting" course as an example to analyze the application of the teaching mode to promote deep learning in the hybrid mode teaching from the design of teaching strategies and course implementation.

Keywords: *Deep learning* problem-solving processes*, professionals*, *Hybrid mode learning.*

I.   PROPOSAL OF QUESTIONS AND RESEARCH BACKGROUND

1.1   Proposal of Questions

Higher vocational education cultivates higher skilled and applied talents with strong professional ability and good professional ethics. In this process, students can obtain the practical ability required by a particular profession or professional group, thus leading to a certain occupation. The basic professional courses are a series of courses designed to cultivate students' basic abilities and qualities, among which practical foundation courses occupy a certain proportion and provide basic knowledge and skills for students' subsequent learning. The dilemma faced by practical foundation courses in traditional classroom teaching is the trade-off between theoretical knowledge and practical operation – overweighting on theory leads to improper operation while emphasizing on practice results in slight theoretical knowledge. Teaching theory while practice makes the teacher dominate the classroom, which is not conducive to student initiative and personalized development. How to break through the teaching dilemma and complete the deep integration of theoretical knowledge and

practical operation with high quality is the urgent need of the teaching reform of practical fundamental courses in higher vocational colleges.

1.2   Research Background

At present, hybrid mode teaching is the hotspot of classroom teaching reform research. Especially in the current context of "Internet + education", the cultivation of innovative talents and educational reform are calling for blended learning again [1]. Hybrid mode learning is the mixture of teaching elements that can enhance teaching effectiveness and optimize teaching methods. Considering the origins and application models of blended learning, it is easyto transplant to vocational education [2]. The diversity of blended learning models also provides ideas for reforming the teaching and learning of practice-based fundamental courses. Xiaoying Feng [3] and others emphasize that blended learning in the "Internet+" era is no longer a simple combination of learning styles, but a new learning paradigm in which online learning, mobile learning and offline learning are fully integrated to bring about changes in teaching models and instructional design. However, blended learning in the "Internet+" stage is not simply a mixture of technologies, but to create a truly highly engaged and personalized learning experience for students [4]. Under the background of blended teaching reform, we should explore the "student-centered" hybrid mode teaching model; promote deep learning and the reform of vocational education from the perspective of learner.

Deep learning is a concept about learning levels first proposed by American scholars Ference Marton and Roger Saljo in 1976, based on students' reading experiments, for isolated memory and uncritical acceptance of knowledge in shallow learning. The theory focuses on the critical understanding of knowledge learning, emphasizes the organic integration of learning content and requires learners to form their own understanding of knowledge, construct a new knowledge system, and continuously improve the construction of the knowledge system in the transfer and application of knowledge and problem solving [5]. Fengqing Li [6] proposed that deep learning is the development of higher-level skills such as independent learning, communication and collaboration, and problem solving on the basis of knowledge mastery, and learners have good emotional learning experience. The characteristics of senior vocational practical foundation courses require students to migrate to the skill application level on the basis of knowledge mastery, so as to complete knowledge construction. Exploring the hybrid mode teaching method based on deep learning for higher vocational practical courses and promoting the teaching reform of practical courses is the trend of the information era.

II.   TEACHING STRATEGIES TO PROMOTE DEEP LEARNING

Hybrid mode teaching, represented by the flipped classroom, reverses the original teaching structure, i.e., shallow knowledge learning occurs before class, and knowledge internalization is achieved in a classroom with teachers' guidance and assistance to promote students' higher-order thinking skills [7]. Learners achieve deeper mastery of knowledge and emotional engagement through hands-on practice, integration, transfer, and application based on shallow understanding of knowledge in practical fundamental courses. We promote

higher-order thinking skills through blended learning, communication and collaboration with peers, and problem-solving processes. Through participation in learning experiences and resource learning experiences, emotional sublimation can be achieved in the cultivation of ability [8].

2.1 Establish the Concept of Deep Learning and Break the Traditional Teaching and Learning Concept

Deep learning is a description of the current state of learning, closely related to students' learning engagement, thinking participation level and individual cognitive experience. It is a highly engaged learning method for cognitive activities under the participation of higher-order thinking [8]. Constructivism believes that the learning process should not be a one-way transfer of information from teacher to student, but rather a process of constructing the meaning of knowledge based on the active deep processing of information by students in a specific socio-cultural environment based on their prior knowledge and experience [9]. Teachers assist students in blended learning to complete the systematic mastery of knowledge and practice. Students further complete the internalization and enhancement of knowledge through the knowledge of problem solving, summarization and reflection, which expand the innovative thinking, and improve the interest and participation in learning.

2.2 Design and Integrate Teaching Contents and Break the Original Teaching Structure.

We should help students build a framework of subject knowledge. According to the characteristics of practical fundamental courses, from the perspective of course orientation, knowledge goals, ability goals, and emotional goals, analyze, sort, and integrate the teaching content. Based on the logical structure of knowledge and skill transfer and students' cognitive sequence, we rearrange the teaching content according to the actual job requirements. Theonline demonstration session deepens students' understanding of basic knowledge points, while the offline practice session promotes knowledge transfer and problem solving. Through online and offline blended teaching arrangements, students' previous knowledge is transformed intothe ability to solve practical problems.

2.3 Reconstruct the Hybrid mode Learning to Break the Original Learning Mode

The "learner-centered" online and offline hybrid mode learning is reconstructed based on task-driven and learner's learning needs, as shown in Fig 1. Learning is divided into three stages: before class, in class and after class. The "learner-centered" hybrid mode learning is conducive to cultivating students' ability to proactively discover and solve problems, stimulating students' enthusiasm for learning and creating a good learning atmosphere through the process of knowledge mastery, ability development and personal experience, breaking the traditional teaching mode that is based on knowledge transfer and teacher-led to address the shortcomings of traditional teaching for students in practical courses.
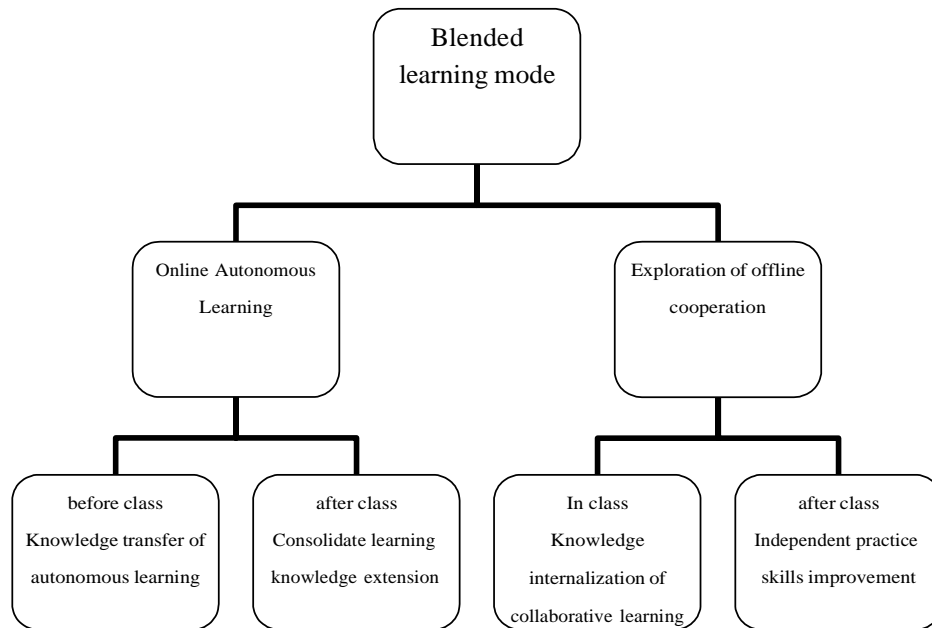
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                        ┌─────────────┐
                        │   Blended   │
                        │learning mode│
                        └─────────────┘
               ┌───────────────┴───────────────┐
        ┌──────────────┐               ┌──────────────┐
        │Online Autonomous│            │Exploration of offline│
        │   Learning    │               │  cooperation  │
        └──────────────┘               └──────────────┘
         ┌──────┴──────┐                 ┌──────┴──────┐
  ┌──────────┐  ┌──────────┐      ┌──────────┐  ┌──────────┐
  │before class│ │after class│     │ In class │  │after class│
  │Knowledge   │ │Consolidate │     │Knowledge │  │Independent│
  │transfer of │ │learning    │     │internaliz-│  │practice   │
  │autonomous  │ │knowledge   │     │ation of  │  │skills     │
  │learning    │ │extension   │     │collaborative│ │improvement│
  └──────────┘  └──────────┘      │learning  │  └──────────┘
                                  └──────────┘
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Fig 1: "Learner-centered" online and offline hybrid mode learning

2.4   Reposition Comprehensive Evaluation Indicators to Facilitate Deep Learning

The teacher's design, implementation, analysis and summary of the evaluation index for students' learning process are effective measures to promote deep learning. Ramsden et al. have done further research on the theories related to deep learning and shallow learning, that is, he made a more detailed elaboration of the definition and found that the evaluation of the learner also affects deep learning [10]. The evaluation system of the whole process before, during and after class is designed for the blended learning mode to fully reflect the comprehensive performance of students' independent learning. In online learning, the number of times students logging on to the platform, time to watch videos, time to submit assignments, whether they are active in expressing their opinions, the number of times they speaking in discussion forums, peer assessment, participation in discussions, extended reading outside of class, chapter test scores, and the quality of online assignments are used as indicators [11], and teachers design the score weights of each part of online and offline learning according to the evaluation indicators.

III.   AN EMPIRICAL STUDY OF HYBRID MODE TEACHING BASED ON DEEP LEARNING

This study takes the practical fundamental courses "Styling and image consulting" of Bikaner Polytechnic College as an example, analyzes the problems in the traditional teaching of the course and formulates teaching strategies for the problems.

3.1   Problems Analysis in Traditional Teaching of "Styling and image consulting Course"

Firstly, relying on classroom teaching is not conducive to the improvement of students' aesthetics. Traditional classroom teaching resources do not broaden students' horizons, popular fashion elements are not captured in a timely manner. Students' aesthetic ability is so poor that they lack the ability to appreciate, design and package works from a professional

perspective. Under the background of "Internet +" education, the network is flooded with rich resources, andfashion elements and popular works are updated and replaced rapidly. Through hybrid mode teaching, if teachers regularly retrieve relevant resources and website links, and guide students to study independently online and make discussion and analysis offline, it will subconsciously improve students' aesthetic ability, and develop the ability to learn and retrieve resources independently and actively.

Secondly, the teacher's practical demonstration and lecture are not conducive to stimulating students' initiative. Traditional teaching has formed the habit of students to passively listen to lectures and watch teachers' practical demonstrations, and students lack the ability to actively explore makeup design. By applying hybrid mode teaching, teachers present videos or resource links before class, so that students complete the learning in advance independently. During the class, students try to practice themselves under teachers' guidance, in the way that the subjectivity, participation and enthusiasm of the students will be activated.

Thirdly, traditional classroom teaching cannot better meet the individual needs of students. Teacher-led classroom teaching practice and operation demonstration somehow undermine the creativity of students, which is not conducive to students' personalized development. There are no relevant demonstrations learning materials before and after class, so that teaching cannot reach the expected results. It is beneficial to students' individual development if students learn online before the lesson and actively imitate the operation themselves; a teacher test the students' self-study effect, corrects problems, and emphasizes the key points, demonstrates the difficulties, and gives individualized guidance to students' practical operation.

Finally, teacher-led practical class can hardly guarantee the quality of teaching. Teachers' lectures and demonstrations in the practical classroom are not conducive to discovering the problems encountered in their own practice. Face makeup that seems easy to create, without basic knowledge and cultural heritage, styling works can be difficult to achieve commercial requirements. If students use blended learning to practice on their own, identify problems, solve them through the teacher's guidance and draw conclusions, they will give full play to their learning advantages and achieve their learning goals.

3.2   Hybrid mode Teaching Design based on Deep Learning

3.2.1   Course Positioning

"Styling and image consulting courses" is the basic core course of Bikaner polytechnic College for character styling of wedding majors. This course makes studentsproficient in the application of drawing, color knowledge, aesthetic judgment standards, master all kinds of makeup making professional techniques and practical skills, and cultivate students' thinking method and ability of overall styling design.

3.2.2   Build Course Learning Thinking Maps

According to the talent cultivation program, the characteristics of practical courses and the needs of make-up artist positions, the course content is planned as a whole to build up the knowledge framework for students' learning. Theoretical knowledge, basic operation demonstration and extended resources are completed by students online. The project-based practical skills module is completed offline, teachers answer questions offline and students can practice the module to achieve application of knowledge. The course content, teaching

objectives, teaching resources, and assessment schemes are systematically designed according to students' characteristics and learning styles and the learning task list is clearly designed.

3.2.3 Course Content Design

1) Clarify the goal; break down the knowledge points in pieces, and design learning resource packages for each knowledge point. Micro-videos are designed with a combination of explanations, demonstrations and key knowledge text emphasis to stimulate students' interest and attract active learning, while stimulating their desire to actively practice the operations. Learning task sheets are designed to clarify task objectives and guide students to learn purposefully and systematically in order to achieve the desired learning outcomes.

2) Diversified resources, according to individual learner differences, provide multi-level and multi-type learning resources, including text reminders of key knowledge points, micro-videos that integrate knowledge points and operational techniques, extended video resources and e-books, resource links and so on.

3) Evaluation of learning effect, design self-test classification test question bank for micro-video learning, basic knowledge question bank, skill points question bank and sample film appreciation question bank. Through effective assessment means, stimulate students' participation and sense of achievement in independent learning. Reasonably arrange the weights of online learning and offline learning assessment.

3.3 Design the Teaching Implementation Process of Styling and image consulting Course Based on Deep Learning

This study is based on Superstar Learning platform "One End, Three Platforms" as shown in Fig 2. Teachers create courses on the platform in advance, upload course learning materials in the in the back-end, and carry out online teaching activities and teaching management through the platform. Students use the terminal devices to study the courses in fragmented time. Teachers publish online activities and guide students to complete their learning tasks
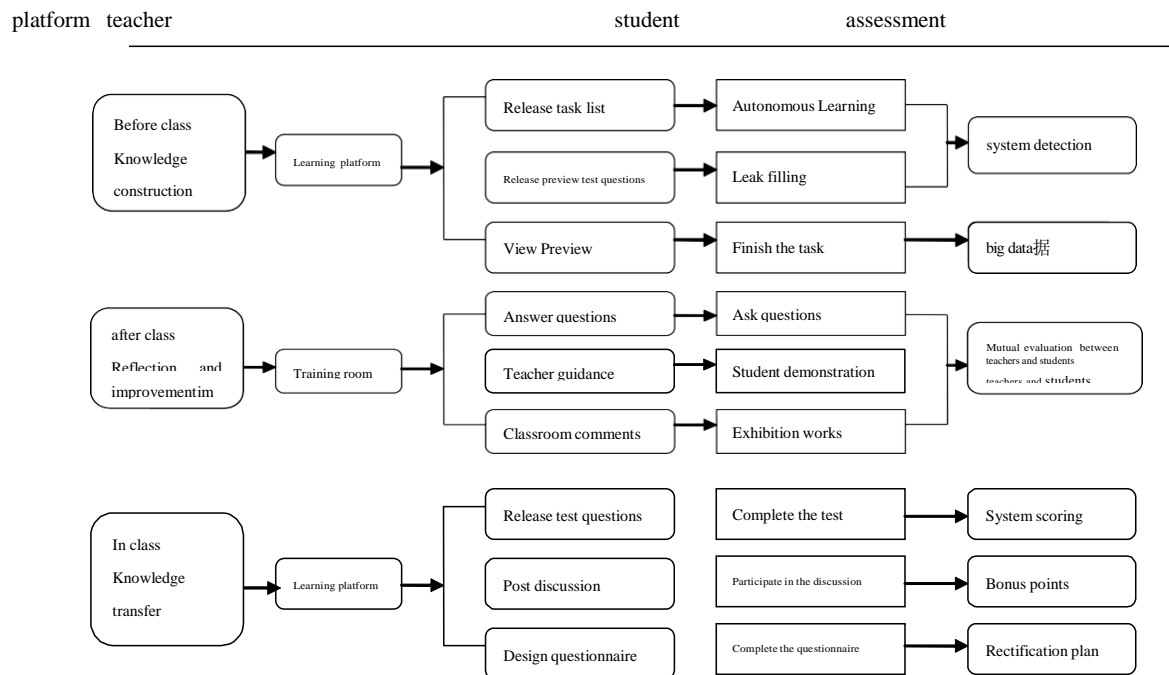
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| platform | teacher | | | student | | assessment |

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Before class        Learning platform      Release task list ──► Autonomous Learning
Knowledge                                                                              ──► system detection
construction                               Release preview test questions ──► Leak filling

                                           View Preview ──► Finish the task ──► big data据

after class          Training room         Answer questions ──► Ask questions
Reflection and                                                                         ──► Mutual evaluation between teachers and students
improvementim                             Teacher guidance ──► Student demonstration

                                           Classroom comments ──► Exhibition works

In class             Learning platform     Release test questions ──► Complete the test ──► System scoring
Knowledge
transfer                                   Post discussion ──► Participate in the discussion ──► Bonus points

                                           Design questionnaire ──► Complete the questionnaire ──► Rectification plan
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Fig 2: The implementation process of styling and image consulting course based on deep learning

1)   Online Self-study before Class to Acquire Knowledge.

Before class, students acquire knowledge through self-study and self-assessment on the platform. Teachers publish learning task lists through the teacher account on Superstar platform to provide different levels of learning materials. Students choose online resources according to the requirements of the task list, set their own pace and learn on demand. They acquire knowledge through videos and PPT, organize learning notes, build shallow understanding and cognition, and complete relevant tests to get feedback on learning results. Through the platform data statistical analysis, the teacher grasps the learners' learning dynamics, check the completion of online tasks, and analyzes the students' online learning effect through the topic discussion reply and test results, and gives timely guidance and help. Under the teacher's guidance, students acquire the basic knowledge for practical operation in class.

2)   Exploration Offline to Transfer Knowledge

In the class, the teacher encourages students to apply their online self-study knowledge to problem solving through practical tasks, internalizing the knowledge and externalizing it into practical skills. The teacher demonstrates key techniques and students record the demonstration on their mobile phones to deepen their understanding and provide reference for their own standard operation. The teacher arranges student groups to demonstrate and providepersonalized instruction to each other, which enables students to transfer knowledge and applyit through teamwork. At the end of the lesson, the groups will show their work to each other, enjoy and evaluate each other's work, so as to develop students' ability to appreciate works.

3)   **Post-lesson Testing and Reflection**

Teachers design theoretical test bank for key operations. Students complete online assignments and online tests through the Superstar Learning app to consolidate key basic knowledge. Teachers make out students' mastery through grades. After-class practical assignments are completed to further deepen knowledge and understanding. Students identify problems, summarize deficiencies and reconstruct knowledge through evaluation results. Meanwhile, the teacher designs questionnaires from time to time to grasp the whole learning state of the learners, so as to adjust the teaching method in time to optimize the teaching effect continuously.

IV.   RESULTS ACHIEVED

The present results are based on the author's teaching class 1 as an experimental class using blended approach, and class 2 of the same grade as a control class using traditional face-to-face format, with both classes having 45 students.

4.1   Comparison of Students' Overall Ability Evaluation

After completing the course, a series of questionnaires with the same content were conducted among students in both classes to investigate the improvement of students' styling ability, creative and innovative ability, aesthetic ability, hands-on ability and knowledge transfer ability, as shown in Figure 3. Fig 3 shows that the number of students in the experimental class is higher than that in the control class in terms of overall improvement of students' ability after learning the course "Basic Styling and image consulting". The experimental class has more students with innovative and creative ability, knowledge transfer and application ability. Especially in terms of aesthetic ability, the number of experimental class is 28 higher than the control class, showing a large gap. In terms of hands-on ability, there is a smaller difference of 5 students. It can be seen that the implementation of blended teaching in the "Basic Styling and image consulting" course has broken the traditional channels for imparting knowledge, broadened students' horizons and improved their comprehensive abilities.
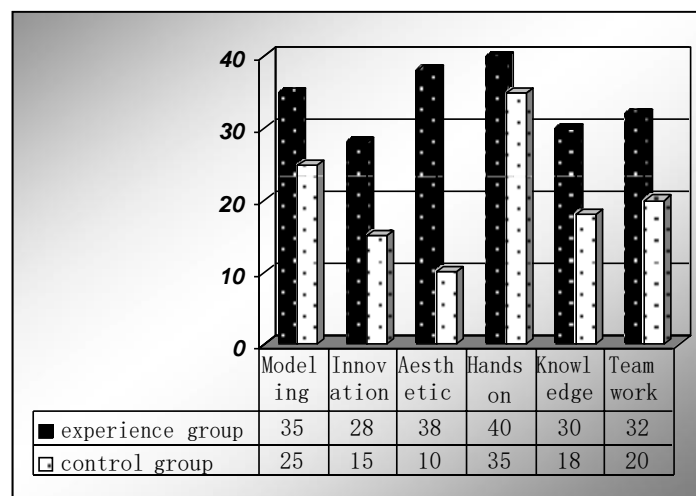

	Model ing	Innov ation	Aesth etic	Hands on	Knowl edge	Team work
■ experience group	35	28	38	40	30	32
□ control group	25	15	10	35	18	20

Fig 3: Comparison of the proportion of students in the control class and the experimentalclass in improving the overall ability

4.2 Comparison of Final Exam Results

After the action research within a semester, students in both classes are given final examinations of equal difficulty, and the percentage of the number of students who score excellent in the final examinations is compared through a line graph, as shown in Fig 4. It shows that the proportion of students in the experimental class with scores above 90, 80-89, 70-79, and 60-69 is higher than that of the control class; compared to the control class, the excellent rate (80 or above rate) increases by 38% and the poor rate (below 60 rate) decreases by 33%. The results show that the deep integration of online learning and offline classroom learning has changed the traditional teaching shortcomings of make-up courses and effectively promoted students' in-depth learning.
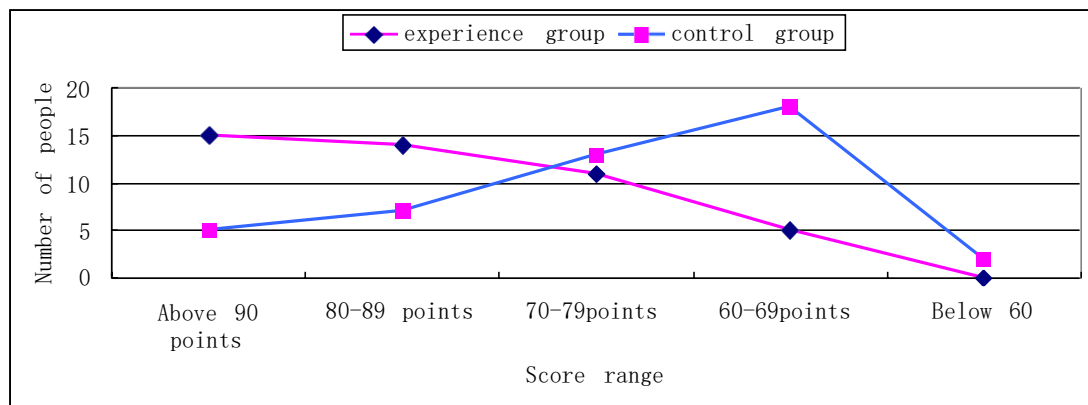

Fig 4: Comparison table of the proportion of experimental class and control class

V. CONCLUSIONS AND REFLECTIONS

In order to solve the problems of traditional teaching in the practical fundamental courses, this study proposes the hybrid mode teaching method based on deep learning, specifically from the design of teaching strategies and course implementation process, and takes the course "Basic Styling and image consulting" as an example. The results show that the deep learning-based hybrid mode teaching effectively solves the shortcomings of the traditional classroom teaching of practical fundamental courses. Follow-up research will continue to optimize the design of the course and conduct comparative analysis through a large amount of quantitative data to obtain more accurate research results, so as to promote the application of the deep learning-based hybrid mode teaching in high vocational classes.

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